What is claimed:

1. An antenna array comprising a fractile array having a plurality of antenna elements uniformly distributed along a Peano-Gosper curve.

5   2. An antenna array comprising an array having an irregular boundary contour wherein the irregular boundary contour comprises a plane tiled by a plurality of fractiles, said plurality of fractiles covers the plane without any gaps or overlaps.

3. A method for generating an antenna array having improved broadband performance, comprising the steps of:

10   tiling a plane with a plurality of non-uniform shaped unit cells of an antenna array;

           optimizing the non-uniform shape of the unit cells; and

           optimizing the tiling of said unit cells.

4. The method of claim 3, wherein the optimizing further comprises at least one of a

15   genetic algorithm or a particle swarm optimization.

5. A method for rapid radiation pattern formation of a fractile array, comprising the steps of:

           a) employing a pattern multiplication for fractile arrays, comprising:

                 deriving a product formulation for the radiation pattern of a fractile array

20   for a desired stage of growth;

           b) recursively applying step (a) to construct higher order fractile arrays; and

           c) forming an antenna array based on the results of step (b).

6. A method for rapid radiation pattern formation of a Peano-Gosper fractile array, comprising the steps of:

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a) employing a pattern multiplication for fractile arrays, comprising:

deriving a product formulation for the radiation pattern of a fractile array

for a desired stage of growth;

b) recursively applying step (a) to construct higher order fractile arrays; and

5   c) forming an antenna array based on the results of step (b).